

Notes on the breeding habits of the Indian sheath-tailed bat, *Taphozous melanopogon* (Temminck)¹

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The study of the breeding habits of the tropical bats has received attention of biologists more recently after the pioneer work of Baker and his associates (1936a, 1936b), who showed that there are basic differences in the reproductive behaviour between the bats inhabiting cold climates and those living in warm regions. Although India has a rich bat fauna, the details of reproduction are known with respect to only a few species of bats.

A perusal of earlier literature on the subject reveals that the reproductive patterns of bats can be classified into following types:

1. Copulation is immediately followed by fertilization and pregnancy as in *Rhinopoma kinneari* (Anand Kumar 1965), *Megaderma lyra lyra* (Ramaswamy 1961), in many other species of Indian bats (Brosset 1962).

2. Copulation occurs in autumn; the inseminated sperms survive in the female reproductive tract of the hibernating female during winter and fertilize the ova released in the following spring as in *Nyctalus noctula* (Grosser 1903), *Myotis lucifugus lucifugus* (Wimsatt 1942). In *Pipistrellus ceylonicus chrysothrix* (Madhavan 1971) the inseminated sperms survive in the female genital tract and

fertilize the ova released about one month after copulation.

3. There is no restricted breeding season, and the breeding occurs throughout the year as in *Taphozous longimanus* (Gopalakrishna 1955), *Desmodus rotundus murinus* (Wimsatt & Trapido 1952).

Collections of specimens of *Taphozous melanopogon* were started in August 1972. *Taphozous melanopogon* is colonial in habit and lives in caves and old temples. Specimens of this species were collected from old temples and caves in and around Bhubaneswar, Orissa, India. Excepting July, specimens were collected in all the months of the year for two consecutive years. Absence of collections in July does not seriously affect the conclusions drawn in the present report. Frequent collections were made during the breeding season, to obtain closely graded stages of development. After killing the specimens, the body weight and the wing span length was recorded. A collection diary incorporating all details was maintained. Majority of the complete specimens were fixed and preserved in 10 per cent neutral formalin. The genitalia were dissected out and fixed in various fixatives such as Bouin's fluid, Cornoy's fluid, Neutral formalin, and were preserved in 70 per cent alcohol. Whenever necessary the male and the female genitalia were dehydrated by passing through graded series of alcohol,

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TABLE 1
SUMMARY OF COLLECTION DIARY

Month/Date	Females				Males		Total
	Non-pregnant		Pregnant	Young	Adult	Young	
	Non-lactating	Lactating					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
January							
10-i-73	8	—	—	—	4	—	12
18-i-74	6	—	—	—	—	—	6
22-i-73	10	—	—	—	8	—	18
25-i-74	8	—	3	—	—	—	11
28-i-73	6	—	8	—	—	—	14
31-i-74	5	—	9	—	3	—	17
February							
2-ii-74	2	—	6	—	—	—	8
5-ii-74	—	—	13	—	5	—	18
13-ii-73	—	—	8	—	5	—	13
20-ii-73	—	—	12	—	5	—	17
March	—	—	23	—	14	—	37
April	—	—	31	—	15	—	46
May							
10-v-73	—	—	8	—	6	—	14
20-v-74	—	—	9	—	10	—	19
27-v-74	—	4	9	1	5	3	22
June							
2-vi-73	—	3	4	—	—	3	10
5-vi-74	—	7	3	4	—	3	17
10-vi-74	—	12	—	5	5	7	29
26-vi-73	—	4	—	2	5	2	13
July	No Collection						
August	9	—	—	—	13	—	22
September	6	—	—	—	9	—	15
October	14	—	—	—	12	—	26
November	30	—	—	—	25	—	55
December	26	—	—	—	37	—	63
Total	130	30	146	12	186	18	522

Foot note:-

1. The word 'Young' has been used in Table 1 to denote those specimens which are attached to the breasts of the mothers.
2. Datewise collection is mentioned in the months of January, February, May and June in support of the conclusion drawn in the present report.
3. The free Immature females and males are in-

cluded in Table 1 with the non-lactating adult females and adult males respectively.

4. From January to June although more male specimens were caught only a limited number or none (as mentioned in Table 1) were brought to the laboratory. During these months the females and males were found to segregate at different corners within the same colony.

BREEDING HABITS OF TAPHOZOUS MELANOPOGON

embedded in paraffin, sectioned at a thickness of 10 μ and stained in Haematoxylin-eosin.

A pair of pectoral mammary glands are present one on each side in the female. The teats are distinctly visible in the lactating female.

Table 1 gives the summary of the collection diary. The present report is based on the observations of 522 specimens of *Taphozous melanopogon*, collected for a period of two years. Examination of the total collection of female specimens of *Taphozous melanopogon* reveals that pregnancies as evidenced by the occurrence of bulbous uterine cornua are noticed in this bat from about the last week of January to about the third week of May. Among the eleven females collected on 25th January 1974, three showed unmistakable signs of pregnancy since the right uterine cornua were swollen and richly vascularized. To confirm these findings all the three female genitalia were sectioned, and observed under the microscope. Microscopic examination of the serial sections of the right side of the female genitalia showed the presence of a single corpus luteum of early pregnancy in the right ovary and a blastocyst in the right uterine cornu in each specimen. Progressively from 25th January to 5th February a greater proportion of females had bulbous uterine cornua among the females collected on different dates. Altogether thirteen females were collected on 5th February, and all of them showed unmistakable signs of pregnancy. All females collected between 5th February and 20th May were pregnant, each carrying a single foetus in the right cornu of the uterus. No pregnancy was observed during the other months of the year. On 20th May, nine females were collected and all of them were at very advanced stages of pregnancy. Out of the thirteen females collected on 27th May, four were delivered each carrying

a single young attached to the breast, while nine females were still at very advanced stages of pregnancy. All the twelve females collected on 10th June had delivered, each carrying a single young attached to the breast.

The above facts indicate that *Taphozous melanopogon* breeds once in the year in a restricted period, bringing forth a single young during each cycle.

The female reproductive organs of *Taphozous melanopogon* consists of a pair of ovaries, a bicornuate uterus and a vagina. From the last week of January to the first week of June over 140 females were collected and all of them were pregnant. Secondly, in all the pregnant females pregnancy was noticed only in the right cornu of the uterus. It cannot be an accident that even a single immature female specimen could not be obtained during the breeding season. These observations lead to the following conclusions:

1. Although the uterus is bicornuate and morphologically bilaterally symmetrical in this bat the right cornu of the uterus is physiologically dominant over the left in bearing pregnancy.

2. Evidently, all females must be undergoing copulation followed by fertilization and pregnancy since all females collected during the active period were pregnant. This shows that the young females of *Taphozous melanopogon* born in late May or early June become sexually mature by the next January and breed when they are about eight months old. In this regard this bat resembles *Myotis lucifugus lucifugus* (Wimsatt & Kallen 1957) in which the females become sexually mature within the year of their birth.

With regard to sex ratio in this bat the present observations does not permit the author to come to any definite conclusion, since the males and females of this species were found

segregated within the same colony at different corners, during the breeding season.

On comparing the breeding habits of *Taphozous melanopogon* with that of *Taphozous longimanus* (Gopalakrishna 1955) the following important differences in their sexual behaviour are noticed:

(1) While in *Taphozous melanopogon* breeding occurs once in the year in a restricted period, in *Taphozous longimanus* breeding occurs throughout the year.

(2) While in *Taphozous melanopogon* the right cornu of the uterus is physiologically dominant over the left in bearing pregnancy, in *Taphozous longimanus* pregnancy alternates between the two cornua of the uterus in successive pregnancies. It is, thus evident from

the above comparison that these two species of bats belonging to the same genus have basic differences in their sexual behaviour which is of great interest. Full details of reproduction and associated phenomena is being studied in this laboratory by the author and will be published soon.

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